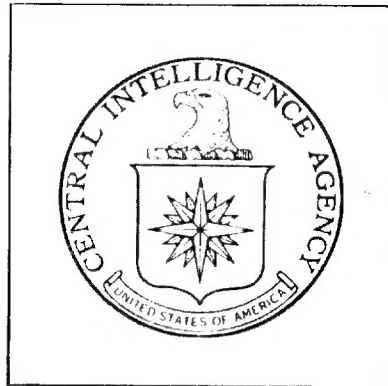


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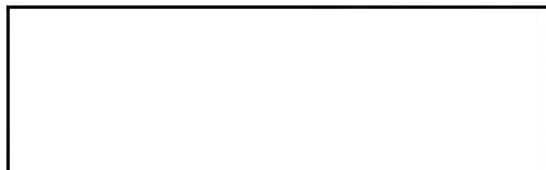
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NIMA / DoD

# *Imagery Analysis Report*

Electrolytic Copper Refinery

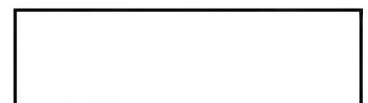
Verkhnyaya Pyshma, USSR

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## VERKHNYAYA PYSHMA ELECTROLYTIC COPPER REFINERY

### SUMMARY

The Verkhnyaya Pyshma Electrolytic Copper Refinery, located near Sverdlovsk, is one of the major copper producers within the Soviet Union. When this refinery was first observed on photography [REDACTED] all of the major production facilities were complete and in operation.

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It is estimated that the refinery can produce approximately 215,000 tons of refined copper per year.

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FIGURE 1. LOCATION MAP

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## VERKHNYYAYA PYSHMA ELECTROLYTIC COPPER REFINERY

USSR

## INTRODUCTION

The Verkhnyaya Pyshma Electrolytic Copper Refinery is located at 56-57-30N 060-34-30E, (Figure 1) in the western suburbs of the city of Verkhnyaya Pyshma, approximately 7 nautical miles north-northwest of Sverdlovsk, USSR.

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This refinery was studied using all available photographic coverage. The purpose of this report is to identify, measure, provide a detailed analysis of the existing facilities, including new construction, and to determine the production capacity of refined copper.

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## DISCUSSION

The Verkhnyaya Pyshma Electrolytic Copper Refinery is both road and rail served and occupies an area of approximately 187 acres. The plant consists of the following facilities: an electrolytic cell building, a furnace/casting building, a possible fabrication building, a copper sulfate/sulfuric acid section, three by-products recovery buildings, and numerous warehouses and support buildings. Two cooling ponds are located immediately west of the plant area. Descriptions and dimensions of the major buildings are listed in Table 1, that is keyed to Figure 4.

When the plant was first observed on photography all of the major production facilities were complete and in operation. The plant was observed in operation on all imagery used for this report. The following discussions describe the main production components and facilities.

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Furnace/Casting Building

Blister copper, brought in by rail, is converted to anodes in Building 7. The blister copper is charged into oil-fired reverberatory furnaces,

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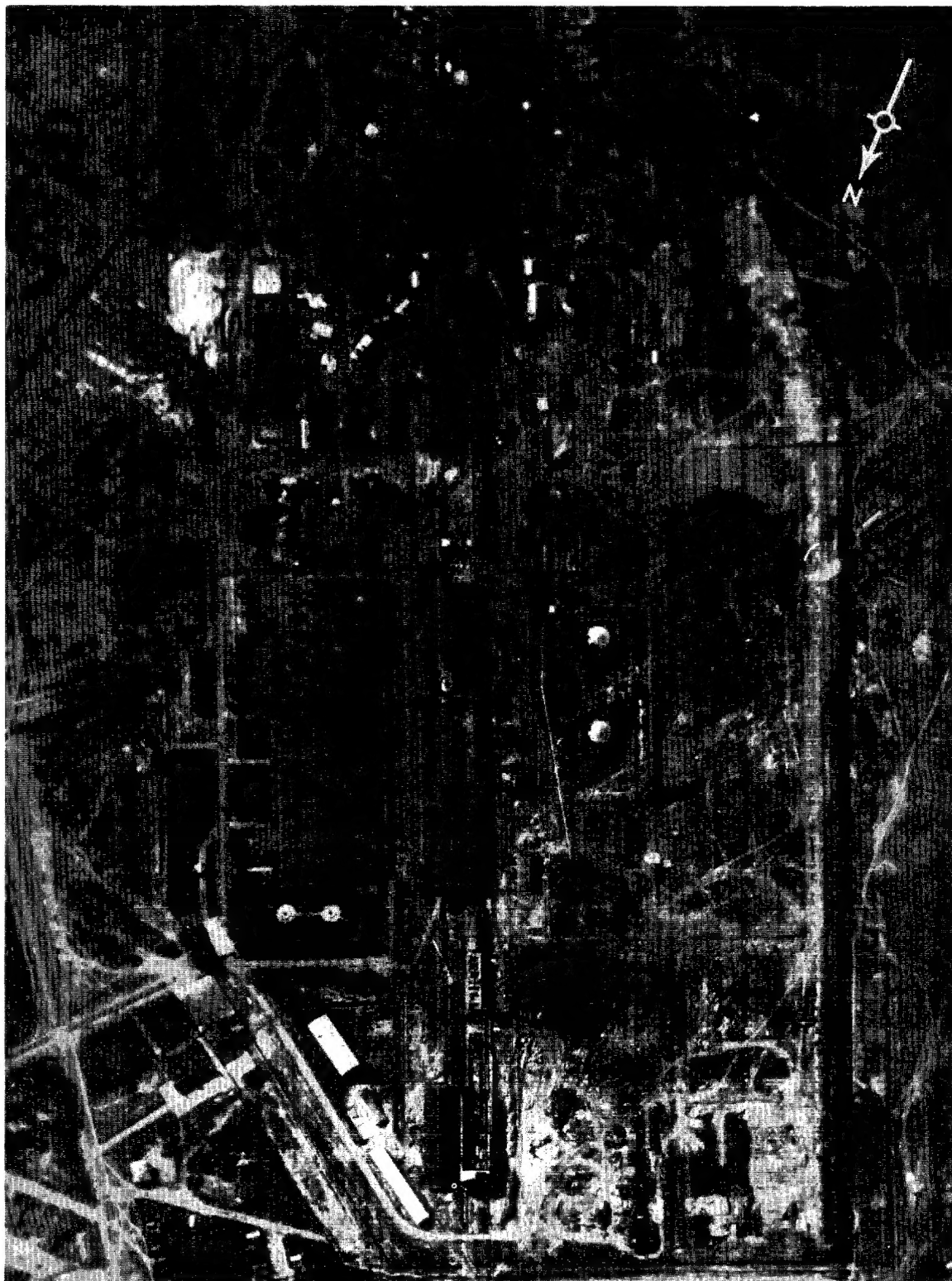


FIGURE 2. VERKHNYAYA PYSHMA ELECTROLYTIC COPPER REFINERY,

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where it is poled to remove oxide impurities before it is cast into anodes which are sent in the electrolytic cell building (Item 6) for refining.

In this building the pure copper cathodes from the electrolytic cell building are also melted and cast into various shapes for subsequent fabrication in Building 19.

### Electrolytic Cell Building

The anodes are positioned in the cells which are filled with an electrolyte solution of copper sulphate and sulfuric acid. The passage of direct current through the cells causes the copper to pass through the electrolyte solution and be deposited on the cathodes. Impurities settle to the bottom of the cells as a slime. These slimes contain rare metals which are recovered in Buildings 20, 21, and 22. The contaminated electrolyte solution is regenerated in Building 14 and valuable by-products including nickel are recovered.

From a comparison of US copper refineries, it was found that a ratio exists between the size and production capacities of their electrolytic cell buildings. Using this ratio as a base, it is estimated that the electrolytic cell building of the Verkhnyaya Pyshma Electrolytic Copper Refinery can produce approximately 215,000 tons of refined copper per year.

### Other Facilities

A possible fabrication building (Item 19) was built [redacted] [redacted] It is used for the fabricating of copper products. Two cooling ponds are located west of the plant area. The electrical power is supplied by the Sverdlovsk Thermal Power Plant, located 4.5 nautical miles northwest of the refinery.

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FIGURE 3. VERKHNYAYA PYSHMA ELECTROLYTIC COPPER REFINERY

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**TABLE 1**  
**VERKHNYAYA PYSHMA ELECTROLYTIC COPPER REFINERY**

ITEM	DESCRIPTION	DIMENSIONS (ft)
1	WAREHOUSE	175 X 65
2	WAREHOUSE	250 X 45
3	WAREHOUSE	310 X 65
4	SHIPPING AND RECEIVING BUILDING	510 X 65
5	WAREHOUSE	300 X 45
6	WAREHOUSE	250 X 50
7	ELECTROLYTIC CELL BUILDING	840 X 330
8	CASTING/FURNACE BUILDING	885 X 180
9	SUPPORT BUILDING	100 X 35
10	BOILER HOUSE	120 X 85
11	SUPPORT BUILDING	80 X 45
12	ADMINISTRATION BUILDING	190 X 35
13	TRANSFORMER YARD	
14	RECTIFIER SECTION	130 X 85
15	COPPER SULPHATE/SULFURIC ACID SECTION	IRREGULAR
16	WORKSHOP	250 X 45
17	WAREHOUSE	280 X 65
18	FUEL OIL TANKS (3) WITH PUMP HOUSE	
19	WAREHOUSE	120 X 35
20	POSSIBLE FABRICATION BUILDING	370 X 85
21	BY-PRODUCTS RECOVERY BUILDING	100 X 55
22	BY-PRODUCTS RECOVERY BUILDING	195 X 45
23	BY-PRODUCTS RECOVERY BUILDING	240 X 85
24	SUPPORT BUILDINGS (3)	100 X 50
		150 X 50
		180 X 45
25	WAREHOUSES (2)	160 X 45
26	WAREHOUSE	500 X 65
27	SUPPORT BUILDING	180 X 45
	SHIPMENT CHECKING BUILDING	185 X 40

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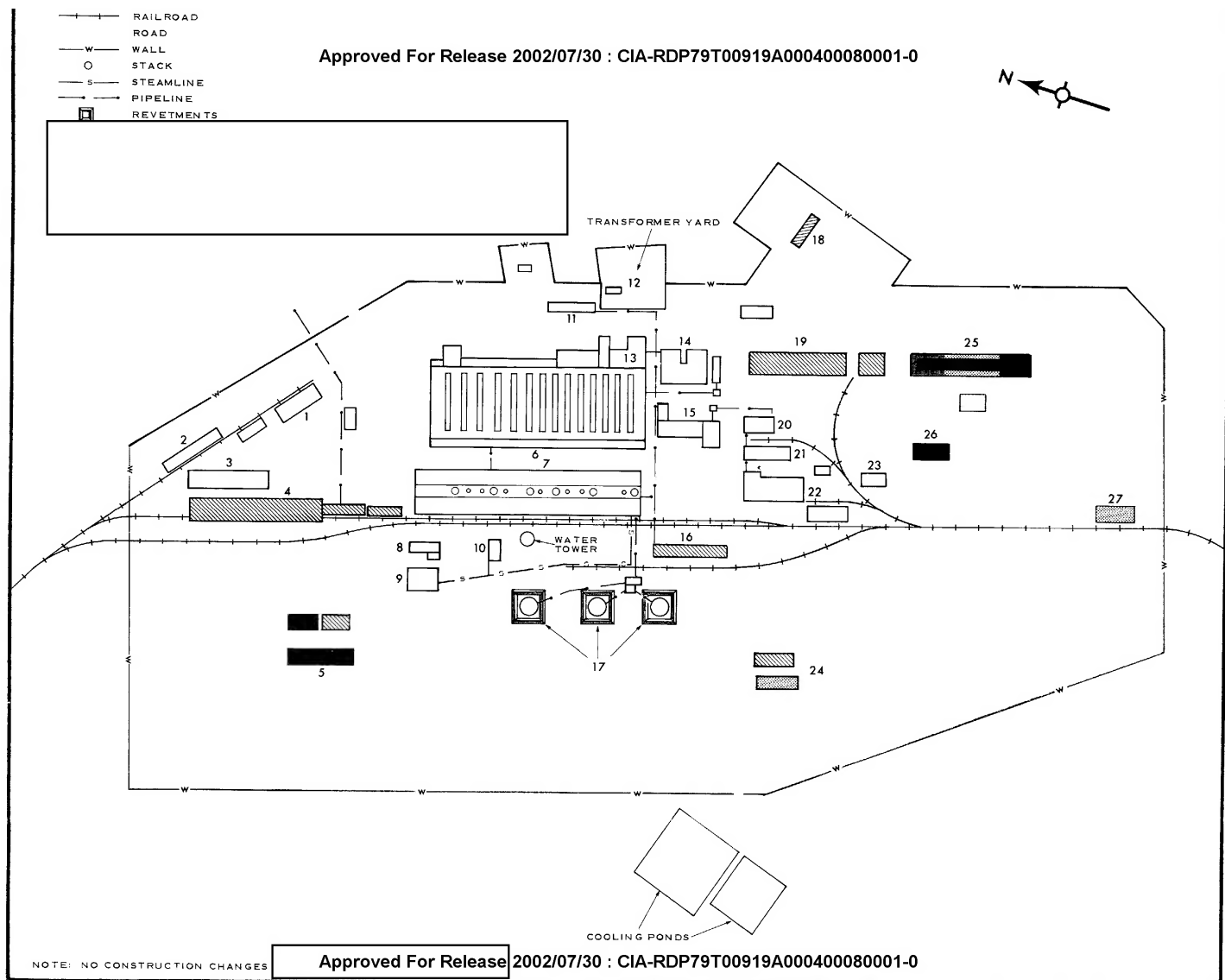


FIGURE 4. VERKHNYAYA PYSHMA ELECTROLYTIC COPPER REFINERY

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